PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 09 July 2001 (09.07.01)	
International application No. PCT/GB00/03970	**Applicant's or agent's file reference** A25742 WO
International filing date (day/month/year) 16 October 2000 (16.10.00)	**Priority date** (day/month/year) 18 October 1999 (18.10.99)
Applicant BOWSKILL, Jeremy, Michael et al	

1. The designated Office is hereby notified of its election made:

   [X] in the demand filed with the International Preliminary Examining Authority on:

   10 April 2001 (10.04.01)

   [ ] in a notice effecting later election filed with the International Bureau on:

   _____

2. The election [X] was

   [ ] was not

   made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Zakaria EL KHODARY

Telephone No.: (41-22) 338.83.38

TENT COOPERATION TREATY

REC'D 21 FEB 2002
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

8

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
A25742 WO		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/03970	16/10/2000	18/10/1999
International Patent Classification (IPC) or national classification and IPC G06F3/00		
Applicant BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10/04/2001	19.02.2002
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Quesson, C Telephone No. +49 89 2399 2667

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03970

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

3-10	as published			
1,2	as received on	22/01/2002	with letter of	22/01/2002

Claims, No.:

1-8	as received on	22/01/2002	with letter of	22/01/2002

Drawings, sheets:

1-6	as published

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-8
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-8
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 1-8
	No:	Claims

2. Citations and explanations
   see separate sheet

Re Item V

A. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

A.1. Prior art

Reference is made to the following document/s/:

D1: EP-A-0 453 128 (AMERICAN TELEPHONE & TELEGRAPH) 23 October 1991 (1991-10-23)

D2: WO 98 25423 A (NOKIA TELECOMMUNICATIONS OY ;KINNUNEN KIMMO (FI); SCHRODERUS OSMO) 11 June 1998 (1998-06-11)

D3: COLOMBO C ET AL: 'PROTOTYPE OF A VISION-BASED GAZE-DRIVEN MAN-MACHINE INTERFACE' PROCEEDINGS OF THE IEEE/RSJ INTERNATIONAL CONFERENCE ON INTELLIGENT ROBOTS AND SYSTEMS (IROS),US,LOS ALAMITOS, IEEE COMP. SOC. PRESS, 1995, pages 188-192, XP000740890 ISBN: 0-7803-3006-4

D4: US-A-5 570 301 (BARRUS JOHN W) 29 October 1996 (1996-10-29)

D5: US-A-5 907 604 (HSU P ROBERT) 25 May 1999 (1999-05-25)

D1 concerns conferencing with graphical view of participants .
D2 deals with mobile conferencing, and provides a location dependent output signal .
D3 describes iris motion detection for man machine interaction.
D4 discloses a conferencing system with iconified virtual users , providing posture depending representation of user to other participants.
D5 proposes that a caller id related picture be shown to a called person, eg. a caller image .

A.2. The combination of features of the claims are considered as neither known from, nor rendered obvious by the available prior art, because the combination of the features of D2 (detection of the position of a mobile station by means of GPS) with those of D1 (teleconferencing system with graphical view of participants) fails to anticipate the claimed feature of adapting the audio and/or audio output of a mobile interface device responsive to information from a physical detector indicative of the physical context of a user of the device.

B. Certain defects in the international application

B. 1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document/s D1-D5 is not mentioned in the description, nor is/are this/these document/s identified therein.

B.2. Independent claims 1 and 5 are not in the two-part form in accordance with Rule 6.3(b) PCT. No reasons have been be provided why in the present case the two-part form would be inappropriate.
In addition, the applicant has not ensured that it is clear from the description which feature/s of the subject-matter of the claim/s are known from documents D1-D5 (see the PCT Guidelines PCT/GL/3 III, 2.3a).

C. Certain observations on the international application

C. 1. The embodiment/s described on page 4, l. 25 to page 5, line 16, page 5, lines 28-32 and page 9, line 34 to page 10, line 7 do not fall within the scope of the claims. This inconsistency between the claims and the description leads to doubt concerning the matter for which protection is sought, thereby rendering the claims unclear (Article 6 PCT).

The applicant should have removed the inconsistency/, either by amending the claims, or by deleting the "excess" subject-matter from the description and the drawings /by indicating in the description that the embodiment/s concerned do not form part of the invention but represent/s background art / is/are useful for understanding the invention/ (see the PCT Guidelines, III-4.3).

PERSONAL MOBILE COMMUNICATION DEVICE

This invention relates to a device in which the user interface of a mobile personal device is modified according to physical and location context. In particular this invention relates to a mobile teleconferencing device. In a telecommunications conferencing (teleconferencing) facility images are generated relating to a "virtual meeting space". Individuals at a plurality of locations remote from each other, and accessing the facility using different types of access device may interact with ach other in a manner which emulates a conventional meeting. When the user is using a teleconferencing facility the physical and location attributes may be used to modify a representation of the user. The detected physical and location attributes may also b used to modify the interface of the teleconferencing device.

Individual users are represented in the virtual meeting space display by computer-generated representations of the users, known as "avatars" (or "icons"). These may be derived from video images of the users, either live or retrieved from a store, but usually they are digitally generated representations. In general, each user is able to select the appearance of his or her avatar in the virtual space from a menu of characteristics. Alternatively, each individual user may be able to select, for his own viewpoint, how each of the other users' avatars will appear. Other characteristics of the meeting space, such as the colour and shape of the elements of the meeting space, may also be selectable by the user.

According to the present invention there is provided a mobile interface device for accessing a computer, comprising:

a user interface having visual display means and audio output means; and

a physical detector for detecting attributes indicative of the physical context of a user of the device;

wherein the user interface is responsive to an output of the physical detector in respect of said user to make a corresponding adjustment to output by the visual display means and/ r the audio output means.

Empfangszeit 22.JAN. 10:12

In a preferred embodiment the user interface is responsive to an output of the physical detector indicating that said user is not substantially stationary, to inhibit output by the visual display means.

In a further preferred embodiments, the physical detector further comprises means to detect location attributes of said user and, for example, the physical detector is arranged to detect when said user is located within a building.

Preferably the output of the audio output device is dependant upon the location attributes of the user, and preferably the output of the visual display device is dependent upon the location attributes of the user.

According to the invention there is also provided a mobile teleconferencing apparatus comprising such a mobile interface device.

An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings, in which:

Figure 1 shows a network with human/machine interface units serving teleconference users via respective client apparatuses;

Figure 2 is a representation of a teleconference as displayed on an interface unit of Figure 1;

Figure 3a is a block diagram showing a client apparatus of Figure 1 which incorporates a physical and location sensor;

Figure 3b is a functional block diagram showing the logical operation of the apparatus shown in Figure 3a; and

Figures 4 to 7 are examples of representations of a user as shown on an interface unit of Figure 1, in which the representation of the user is dependent upon location and physical data collected using the apparatus shown in Figure 3a.

Figure 1 shows a network serving four users 1, 2, 3, 4 (not shown) allowing them to interact in a virtual teleconf rence. Each us r has a respective human/machine interface unit 21, 22, 23, 24, which includes video and/or audio equipment for the us r to

CLAIMS

1. A mobile interface device for accessing a computer (10), comprising:

a user interface (11, 21) having visual display means (60) and audio output means (61); and

a physical detector (50) for detecting attributes indicative of the physical context of a user of the device;

wherein the user interface (11)is responsive to an output (51) of the physical detector (50) in respect of said user to make a corresponding adjustment to output by the visual display means (60) and/or the audio output means (61).

2. A mobile interface device according to Claim 1, wherein the user interface (11, 21) is responsive to an output of the physical detector (50) indicating that said user is not substantially stationary, to inhibit output by the visual display means (60).

3. A mobile interface device according to Claim 1 or Claim 2, wherein the user interface (11, 21) is responsive to an output (51) by the physical detector (50) indicative of ambient noise in the vicinity of said user, to make a compensatory adjustment to output by the audio output means (61).

4. A mobile interface device according to any one of claims 1 to 3, wherein the physical detector (50) further comprises means (57, 58, 59) to detect location attributes of said user.

5. A mobile interface device according to Claim 4, wherein the physical detector (50) is arranged to detect when said user is located within a building.

6. A mobile interface device according to Claim 4 or Claim 5, including a store (64) for storing predetermined information corresponding to one or more location attributes detectable by the physical detector (50), and wherein the user interface

(11, 21) is arranged to adjust output by the visual display means (60) and/ r the audio output means (61) in dependence upon an output (51) by the physical detector (50) relating to location of said user and to corresponding information stored in said store (64).

7. A mobile interface device according to Claim 6, wherein said predetermined information identifies a corresponding location type and wherein the user interface (11, 21) is responsive to an identified location type to output a corresponding alert at the audio output means (61).

8. A mobile teleconferencing apparatus comprising a mobile interface device according to any one of the preceding claims.

Empfangszeit 22-Jan-02 15:42

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
A25742 WO		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 00/ 03970	16/10/2000	18/10/1999

Applicant

BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readble form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

[ ] the text is approved as submitted by the applicant.

[X] the text has been established by this Authority to read as follows:

PERSONAL MOBILE COMMUNICATION DEVICE

5. With regard to the **abstract,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 3b

[X] as suggested by the applicant.

[ ] None of the figures.

[ ] because the applicant failed to suggest a figure.

[ ] because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted] 00/03970

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F3/00 H04M3/56 H04Q7/38 G06F3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F H04M H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 453 128 A (AMERICAN TELEPHONE & TELEGRAPH) 23 October 1991 (1991-10-23)	5,8
A	abstract figure 19	1-4,6,7
Y	WO 98 25423 A (NOKIA TELECOMMUNICATIONS OY ;KINNUNEN KIMMO (FI); SCHRODERUS OSMO) 11 June 1998 (1998-06-11)	5,8
A	page 9, line 23 - line 31	1-4,6,7
	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 January 2001	25/01/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Schweitz, M

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted] 00/03970

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	COLOMBO C ET AL: "PROTOTYPE OF A VISION-BASED GAZE-DRIVEN MAN-MACHINE INTERFACE" PROCEEDINGS OF THE IEEE/RSJ INTERNATIONAL CONFERENCE ON INTELLIGENT ROBOTS AND SYSTEMS (IROS),US,LOS ALAMITOS, IEEE COMP. SOC. PRESS, 1995, pages 188-192, XP000740890 ISBN: 0-7803-3006-4 the whole document	1-8
A	US 5 570 301 A (BARRUS JOHN W) 29 October 1996 (1996-10-29) column 2, line 36 -column 3, line 41 figures 1-3	1-8
A	US 5 907 604 A (HSU P ROBERT) 25 May 1999 (1999-05-25) column 1, line 66 -column 2, line 41 figure 3	1-8

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PC[redacted] 00/03970

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0453128 A	23-10-1991	US 5195086 A	16-03-1993
WO 9825423 A	11-06-1998	FI 964817 A	03-06-1998
		AU 5222798 A	29-06-1998
		EP 0941622 A	15-09-1999
US 5570301 A	29-10-1996	NONE	
US 5907604 A	25-05-1999	NONE	

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
26 April 2001 (26.04.2001)

PCT

(10) International Publication Number
WO 01/29642 A1

(51) International Patent Classification[7]: G06F 3/00, H04M 3/56, H04Q 7/38, G06F 3/033

(21) International Application Number: PCT/GB00/03970

(22) International Filing Date: 16 October 2000 (16.10.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
99308195.9 18 October 1999 (18.10.1999) EP

(71) Applicant *(for all designated States except US)*: **BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY** [GB/GB]; 81 Newgate Street, London EC1A 7AJ (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **BOWSKILL, Jeremy, Michael** [GB/GB]; Glen End, School Lane, Martlesham Heath, Woodbridge, Suffolk IP12 4RR (GB). **LOFFLER, Alexander** [GB/GB]; 15 Heath Road, Ipswich, Suffolk IP4 5RZ (GB). **POLAINE, Matthew, John** [GB/GB]; Mafeking Cottage, 125 Church End, Cherry Hinton, Cambridge, Cambs CB1 3LF (GB). **PATMORE, Jeffrey, Joseph** [GB/GB]; 9 Pine Grove, Witham, Essex CM8 2NT (GB).

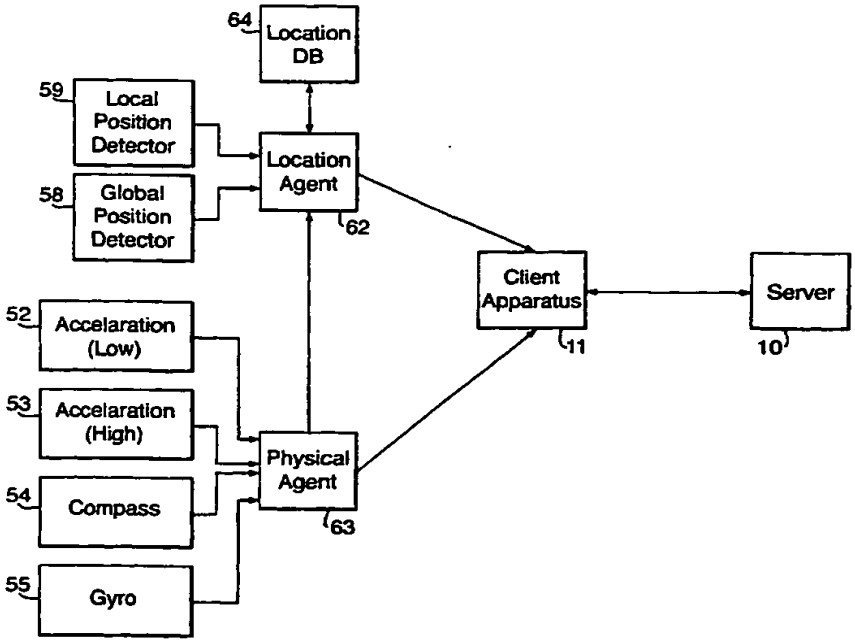
(74) Agent: **SEMOS, Robert, Ernest, Vickers**; BT Group Legal Services, Intellectual Property Dept., Holborn Centre, 8th floor, 120 Holborn, London EC1N 2TE (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

[Continued on next page]

(54) Title: PERSONAL MOBILE COMMUNICATION DEVICE



(57) Abstract: A human computer interface device is provided in which the operation of the user interface depends upon detected physical and location attributes of the user. If a user is moving the user interface switches to auditory output only. Detected location attributes are also used to modify the operation of the user interface. Also provided is a mobile conferencing device incorporating such a human conmputer interface device. In this case the ring-tone or a visual display can be tailored according to the detected location.

WO 01/29642 A1

IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

PERSONAL MOBILE COMMUNICATION DEVICE

This invention relates to a device in which the user interface of a mobile personal device is modified according to physical and location context. In particular this invention relates to a mobile teleconferencing device. In a telecommunications conferencing (teleconferencing) facility images are generated relating to a "virtual meeting space". Individuals at a plurality of locations remote from each other, and accessing the facility using different types of access device may interact with each other in a manner which emulates a conventional meeting. When the user is using a teleconferencing facility the physical and location attributes may be used to modify a representation of the user. The detected physical and location attributes may also be used to modify the interface of the teleconferencing device.

Individual users are represented in the virtual meeting space display by computer-generated representations of the users, known as "avatars" (or "icons"). These may be derived from video images of the users, either live or retrieved from a store, but usually they are digitally generated representations. In general, each user is able to select the appearance of his or her avatar in the virtual space from a menu of characteristics. Alternatively, each individual user may be able to select, for his own viewpoint, how each of the other users' avatars will appear. Other characteristics of the meeting space, such as the colour and shape of the elements of the meeting space, may also be selectable by the user.

According to the present invention there is provided a human computer interface device comprising a user interface device comprising a visual display device and an audio output device; and a physical detector for detecting physical attributes of a user; in which the visual display device is arranged to inhibit output via the visual display device when the user is not stationary.

In a preferred embodiment the device further comprises a location detector for detecting location attribute of the user and in which the operation of the user interface device dependent upon the detected location attributes of the user.

Preferably the output of the audio output device is dependent upon the location attributes of the user, and preferably the output of the visual display device is dependent upon the location attributes of the user.

According to another aspect of the invention there is provided a human computer interface device comprising a user interface device comprising a visual display device and an audio output device; a physical detector for detecting physical attributes of a user; and a location detector for detecting location attributes of the user and in which the operation of the user interface device dependent upon the detected location attributes of the user.

Preferably the output of the audio output device is dependent upon the location attributes of the user, and preferably the output of the visual display device is dependent upon the location attributes of the user.

According to the invention there is also provided a mobile conferencing device including such a human computer interfacing device.

An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings, in which:

Figure 1 shows a network with human/machine interface units serving teleconference users via respective client apparatuses;

Figure 2 is a representation of a teleconference as displayed on an interface unit of Figure 1;

Figure 3a is a block diagram showing a client apparatus of Figure 1 which incorporates a physical and location sensor;

Figure 3b is a functional block diagram showing the logical operation of the apparatus shown in Figure 3a; and

Figures 4 to 7 are examples of representations of a user as shown on an interface unit of Figure 1, in which the representation of the user is dependent upon location and physical data collected using the apparatus shown in Figure 3a.

Figure 1 shows a network serving four users 1, 2, 3, 4 (not shown) allowing them to interact in a virtual teleconference. Each user has a respective human/machine interface unit 21, 22, 23, 24, which includes video and/or audio equipment for the user to

see and/or hear what is happening in the virtual meeting space. The interface unit includes user input devices (e.g. audio input, keyboard or keypad, computer "mouse" etc.) to enable the user to provide input to the virtual meeting space. Each interface unit, 21, 22, 23, 24 is connected to a respective client apparatus 11, 12, 13, 14 which provides an interface between the user and a main server 10 which controls the operation of the meeting space. The server 10 has, as a further input, a virtual reality (VR) definition store 30 which maintains permanent data defining the virtual meeting space (also referred to as the meeting space definition unit in the specification). The control of the meeting space is carried out by interaction between the client apparatuses 11, 12, 13, 14 and the server 10. The display control functions may take place in the server 10, or the display control functions may be distributed in the client apparatus 11, 12, 13, 14, depending on the functionality available in the client apparatus. Links between the client apparatus 11, 12, 13, 14 and the server 10 may be permanent hard-wired connections, virtual connections (permanent as perceived by the user, but provided over shared lines by th telecommunications provider), or dial-up connections (available on demand, and provided on a pay-per-use basis), and may include radio links, for example to a mobile device. The server 10 may have, in addition to the server functionality, similar functionality to the client apparatus 11, 12, 13, 14, but as shown the server 10 is dedicated to the server functi n only.

An example of an image representing a meeting space as it appears on a display device is shown in Figure 2. In this example, users 2, 3 and 4 are represented by avatars 42, 43 and 44 respectively.

Referring again to Figure 1, in response to inputs from one of the users (e.g. us r 1) through his respective user interface 21 the client apparatus 11 transmits these inputs to the main server 10 which, in accordance with the meeting space definition unit 30, controls the images to be represented on the other users' screens in the human machine interface units 22, 23, 24 to represent the activities of the user 1, input through interface device 21. As a very simple example, the actions of the user 1 when first establishing contact with the meeting space are translated by the client apparatus 11 and converted by the server 10, into a representation of the user 1 entering the meeting space, which is in turn passed to the individual clients 12, 13, 14 to be represented as the avatar of the user 1 moving into the field of view of the display devices 22, 23, 24.

The manner of representation of the individual user 1 in the virtual space, for example the appearance of the avatar in terms of age, sex, hair colour etc may be selected either by the user 1 through his respective client device 11, or by each receiving user 2, 3, 4 in the meeting space, who may each select an avatar according to his own requirements to represent the user 1. Similarly, some parts of the virtual meeting space may be defined centrally in the meeting space definition unit 30, whereas other aspects may be defined by each individual client apparatus 11, 12, 13, 14 independently of the others. Such definitions may include colour schemes, the relative locations in the virtual meeting space of the individual users 1, 2, 3, 4, etc.

The client apparatus 11 is a mobile device, and in the embodiment of the invention described here the mobile device 11 is a wireless palmtop computer. In this specification the term mobile device is intended to refer to all computing devices which may be carried around or worn by a user, and may be used whilst the user is moving around and active in other tasks. Mobile devices are distinguished from portable devices which are carried to a location and then used whilst the user is stationary.

However, a mobile device may or may not have visual display capabilities. Even if the device does have such capabilities, the user 1 may be walking or running or otherwise distracted, and may not be able to attend to a visual display. The representation of the user 1 is displayed to the other users 2, 3, 4 as shown in Figure 4, so that the other users are aware that user 1 is on line, but that the user 1 may not have a visual link to the teleconference.

For users using a mobile device there are other aspects of the service to consider beside the fact that the client device 11 may not have as sophisticated input and output capabilities as other client devices 12, 13, 14 . Privacy may be an issue. It is possible that other people might move in and out of the user's proximity during a conversation. In order to make the other users in a conference aware of potential privacy issues the user's avatar is changed as shown in Figure 5 to indicate that the user is on line, but that the user may not be in private. The user 1 can indicate that there is a privacy issue manually, by transmitting a signal via the client 11 to the server 10 using a predetermined key or sequence of keys. The device 11 has an audio input, and as an alternative to using a manually entered key or sequenc of keys to indicate the user is not in private, the received audio signal is analysed, using known speaker recognition algorithms, to

determine whether speech other than that from the user is detected. The device 11 may also be equipped with a video input, in which case the video signal received via the video input can be analysed using known image classification algorithms, for example to detect wither there is skin detected in the captured image, or to detect the number of faces in the captured image. The results of such image classification may then be used to indicate to the server 10 that the user is not in private and the user's avatar is modified accordingly.

Another issue which is relevant to mobile users using radio links to access the virtual meeting space is Quality of Service (QoS). The fixed telephony network uses 64Kbits/s per voice channel while the mobile network uses 9.6 Kbits/s per voice channel. The average number of bits per second transmitted from the client device 11 to the server 10 is monitored by the server 10. The avatar of the user 1 is modified to be more or less opaque as a function of the average number of bits per second received by the server 10 from the client device 11. Hence the opacity of the avatar representing the user 1 related to the QoS as perceived by other users 2, 3, 4. In this embodiment of the invention the more opaque the avatar the better the perceived QoS.

For a mobile user, the attention paid to the virtual meeting space varies in dependence upon the 'real world' task currently being carried out. For example, whilst travelling on a train a user may be required to show a ticket to the ticket inspector, or somebody may speak to the user to ask the time. If the user is walking, running, or unable to remain still for some reason, then the attention paid to the virtual meeting space will be more limited than otherwise. If the user is in a noisy environment, again, the attention paid to the virtual meeting space will be less than it would be in a very quiet environment. Detection of a user's physical and location attributes is discussed in more detail with reference to Figure 3a and 3b.

The audio environment is analysed using the audio signal received via the audio input on the client apparatus 11. It is also possible for the user to use a predetermined key or sequence of keys to indicate via the client apparatus 11 to the server 10 that he is distracted or on the move. Figure 6 shows a representation of a user who is on-line but distracted, and Figure 7 shows a representation of a user who is on line but on the move.

The user interface unit 21 includes a physical and location sensor 50 as shown in Figure 3, as well as a visual display 60 and an audio input/output device 61. The physical and

location sensor 50 is connected to the client apparatus 11 by a serial interface 51. A low acceleration detector 52 measures acceleration of a low force in two directions using an ADXL202. A high acceleration detector 53 measures acceleration of a high force in three directions using an ACH04-08-05 available from Measurement Specialities Incorporated (which can be referenced via Universal Resource Locator (URL) http://www.msiusa.com on the Internet). A direction detector 54 is provided using a compass which gives an absolute measurement of orientation of the client apparatus. A HMC2003, available from Honywell (URL http://www.ssechoneywell.com), is used. The compass is a three-axis magnetometer sensitive to fields along the length, width and height of the device. A direction and velocity detector 55 is provided using an ENC Piezoelectric Vibrating Gyroscope (part number S42E-2 which is sold under the registered trademark GYROSTAR) available from Murata manufacturing Company Ltd. (URL http://www.murata.com). The gyroscope measures angular velocity, giving speed and direction in two directions in each axis of rotation (i. e. six measurements are provided). The acceleration detectors 52, 53, the direction detector 54 and the velocity and direction detector 55 are connected via a multiplexer (MUX) 56 to a microcontroller 57 where the outputs are analysed as will be described later.

A global position detector 58 is provided which measures the absolute location of the device using a Global Positioning System (GPS) receiver which receives signal from GPS satellites.

GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time. The nominal GPS Operational Constellation consists of 24 satellites that orbit the earth twice a day, 11,000 miles above the earth. (There are often more than 24 operational satellites as new ones are launched to replace older satellites.) The satellite orbits repeat almost the same ground track (as the earth turns beneath them) once each day. There are six orbital planes (with nominally four satellites in each), equally spaced (60 degrees apart), and inclined at about fifty-five degrees with respect to the equatorial plane. This constellation provides the user with from five to eight satellites visible from any point on the earth. The GPS satellites orbit the earth transmitting their precise position and elevation. A GPS receiver acquires the signal, then measures the interval between transmission and receipt of the signal to determine the distance between the receiver and the satellite. Once the

receiver has calculated this data for at least 3 satellites, its location on the earth's surfac can be determined.

The receiver used in this embodiment of the invention is a Garmin GPS35 unit (available, for example from Lowe Electronics Ltd in the UK). GPS signals do not propagate inside buildings so a local position detector 59 is also provided which uses local area beacons (LAB's) (not shown) which use low power 418MHz AM radio transmitt rs (such as the CR91Y, CR72P, CR73Q or CR74R from RF Solutions) at known locations within a building. Radio or infrared transmitters could be used, although radio provides a more robust solution since line of sight connections are not required.

Once the "Bluetooth" radio based system becomes available this will also provide a suitable solution. Bluetooth is a standard for wireless connectivity, designed to replace cables between portable consumer devices such as cellular phones, laptop computers, personal digital assistants, digital cameras, and many other products. The Bluetooth version 1.0 specification was agreed in July 1999, and the first products are expected on the market in mid 2000.

Software on the microcontroller 57 gathers sensor data from the detectors 52, 53, 54, 55, via the MUX 56 which is configured to read each device in turn via an analogue port. The output from the global position detector 58 is read via a serial port connection and the output from the local position detector 59 is connected to a digital input on the microcontroller 57. Also provided is a location database 64 which is accessed by the microcontroller 57 to determine location names.

Figure 3b is a functional block diagram showing the logical operation of the physical and location detector 50. A location agent 62, implemented in software on the microcontroller 57, uses location data gathered by the global position detector 58 and the local position detector 59, analyses this data and makes the analysis available to the client apparatus 11. The location agent 62 also receives information about velocity and direction, measured by the direction detector 54 and the velocity and direction detector 55, from a physical agent 63. The physical agent is also implemented in software in the microcontroller 57.

The location agent determines whether GPS is available, and whether the global location measured by the global position detector 58 is based on a signal from three or more satellites. The local position detector 59 detects signals from LAB's, each of which has a unique identifier. The location agent 62 accesses the location database 64 to determine a location name associated with a received LAB identifier. The location agent 62 must be able to determine the following:

- Is the device inside or outside? If less than three GPS signals are received then the device is determined to be inside.
- Is the device moving? A measured velocity from the global position detector 58 (if the device is outside) and velocity measured via the physical agent 63 are used to determine whether the device is moving.
- Location of the device. Latitude and longitude, if the device is outside, are measured via the global position detector 58 and/or a location name is determined using the local position detector 59 and the location database 64.
- Direction of movement. This may be determined by the global position detector and /or by direction data received from the physical agent.

The physical agent 63 analyses physical sensor data and makes this available to the location agent 62. The physical agent is used to determine the following user attributes.

- Standing.
- Walking.
- Sitting.
- Cadence (velocity).
- Acceleration.
- Shock.

The complex nature of the physical data makes the use of simple rules unreliable. The physical agent 63 of this embodiment of the invention uses Hidden Markov Models (HMM) to provide a determination above based on the inputs from the detectors 52, 53, 54, 55, 56. A good description f an implementation of HMM's (as applied to speech recognition, but the principles are the same) may be found in "Hidden Markov Models for Automatic

Speech Recognition: Theory and Application" S.J. Cox, British Telecom Technology Journal Vol. 6, No. 2, April 1988. In other embodiments of the invention it is possible for the physical agent to analyse visual and audio information received from the visual and audio input/output device provided as part of the interface unit 21.

The client apparatus 11 has the physical information made available to it via the physical agent 63, and the location information made available to it via the location agent 62. Audio and/or visual information is used on the mobile device to provide the user with information alerts, and for teleconferencing activity. Spatial audio is also used for information alerts and for spatialised teleconferencing, which appears more natural to the user.

The interface used by the device for information alerts, and the interface used for teleconferencing are dependent on the user's current location and physical context (i. e. is the user standing/ walking/sitting etc). If the user is unlikely to be able to attend to a visual display, an audio interface is used. If the user is likely to be unavailable (eg running) then the device could divert alerts to a messaging service, which could then alert the user when it is determined he is available again. In embodiments of the invention incorporating audio input and analysis it is also possible to configure the audio output on the user's wearable or handheld device to match the acoustics, ambient noise level etc of the real world space in which the user is located. The nature of the interface used (for example the sound of a mobile device's alert or 'ring-tone') can be modified according to the detected user location. For example, a mobile phone handset could use a ring-tone such as a voice saying "shop at the Harrods' sale" if it is determined by the location agent 62 that the user is walking along Knightsbridge (where the famous shop 'Harrods' is located). A phone could use an appropriate piece of music if it is determined by the location agent 62 that the user is in church. Similarly to changing the users' audio interface in dependence on the detected location, the visual display can be altered according to the determined location. The screen style of the visual interface can be made to reflect the theme of the location. For example if the user is viewing web pages, and is walking around a museum, the web pages viewed as the user moves to different locations change to reflect the area of the museum.

In embodiments of th invention including the analysis of visual and audio information received from a visual and audio input/output d vice provided as part of the

interface unit 21, it is possible to use standard spe ch and video analysis algorithms to provide a more sophisticated interface to the user. There are standard algorithms for identifying speech within an audio stream so it would be possible to make a mobile phone handset that auto diverted or changed ring tone if the user is detected to be currently in conversation with someone. Visual information can also be analysed using standard algorithms such as skin detection or face detection and this information can be used along with audio analysis to infer whether the user is likely to be in private, for example.

CLAIMS

1. A human computer interface device comprising

a user interface device comprising a visual display device and an audio output device; and

a physical detector for detecting physical attributes of a user;

in which the visual display device is arranged to inhibit output via the visual display device when the user is not stationary.

2. A device according to claim 1, further comprising a location detector for detecting location attributes of the user and in which the operation of the user interface device dependent upon the detected location attributes of the user.

3. A device according to claim 2 in which the output of the audio output device is dependent upon the location attributes of the user.

4. A device according to claim 2 or claim 3 in which the output of the visual display device is dependent upon the location attributes of the user.

5. A human computer interface device comprising

a user interface device comprising a visual display device and an audio output device;

a physical detector for detecting physical attributes of a user; and

a location detector for detecting location attributes of the user and in which the operation of the user interface device dependent upon the detected location attributes of the user.

6. A device according to claim 5 in which the output of the audio output device is dependent upon the location attributes of the user.

7. A device according to claim 5 or claim 6 in which the output of the visual display device is dependent upon the location attributes of the user.

8. A m bile conferencing device including a human computer interface device according to any one of the preceding claims.

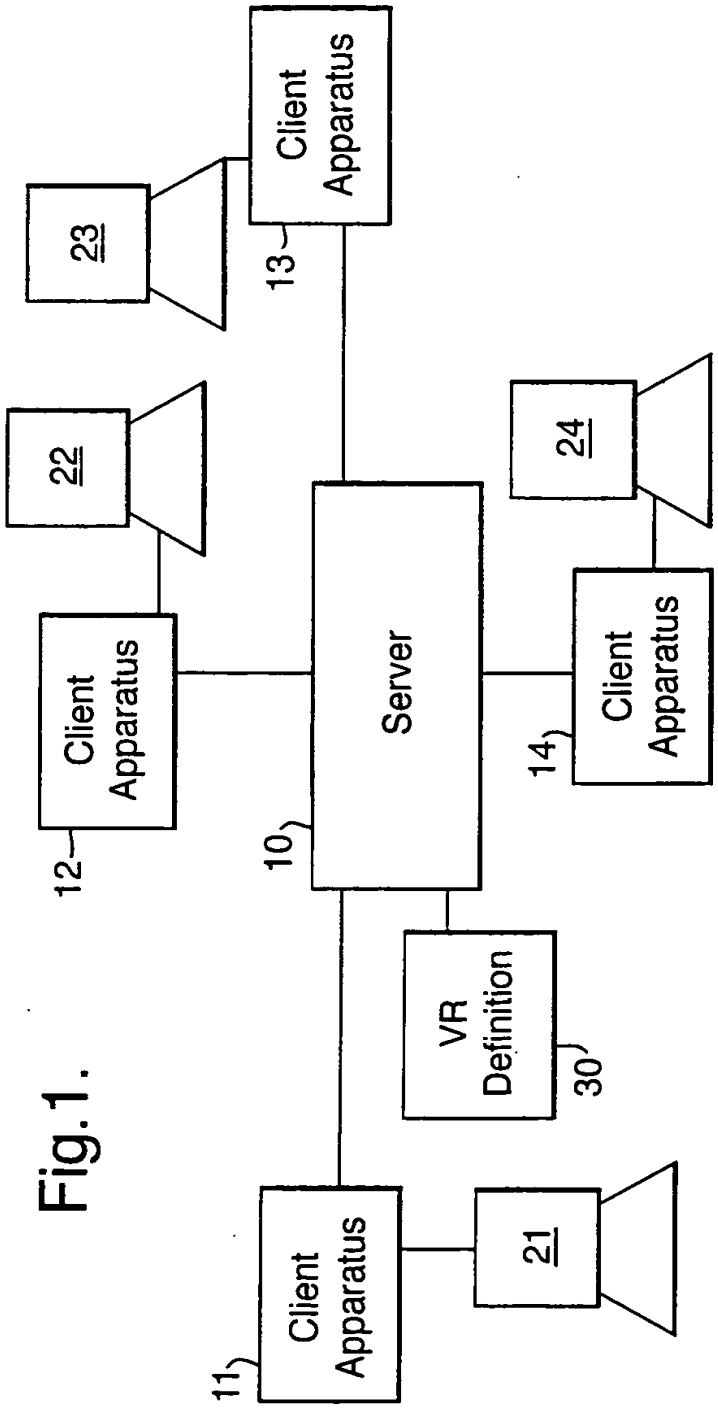

Client Apparatus
13
23
22
24
Server
Client Apparatus
12
10
14
Client Apparatus
VR Definition
30
Client Apparatus
11
21

Fig.1.

Fig.2.

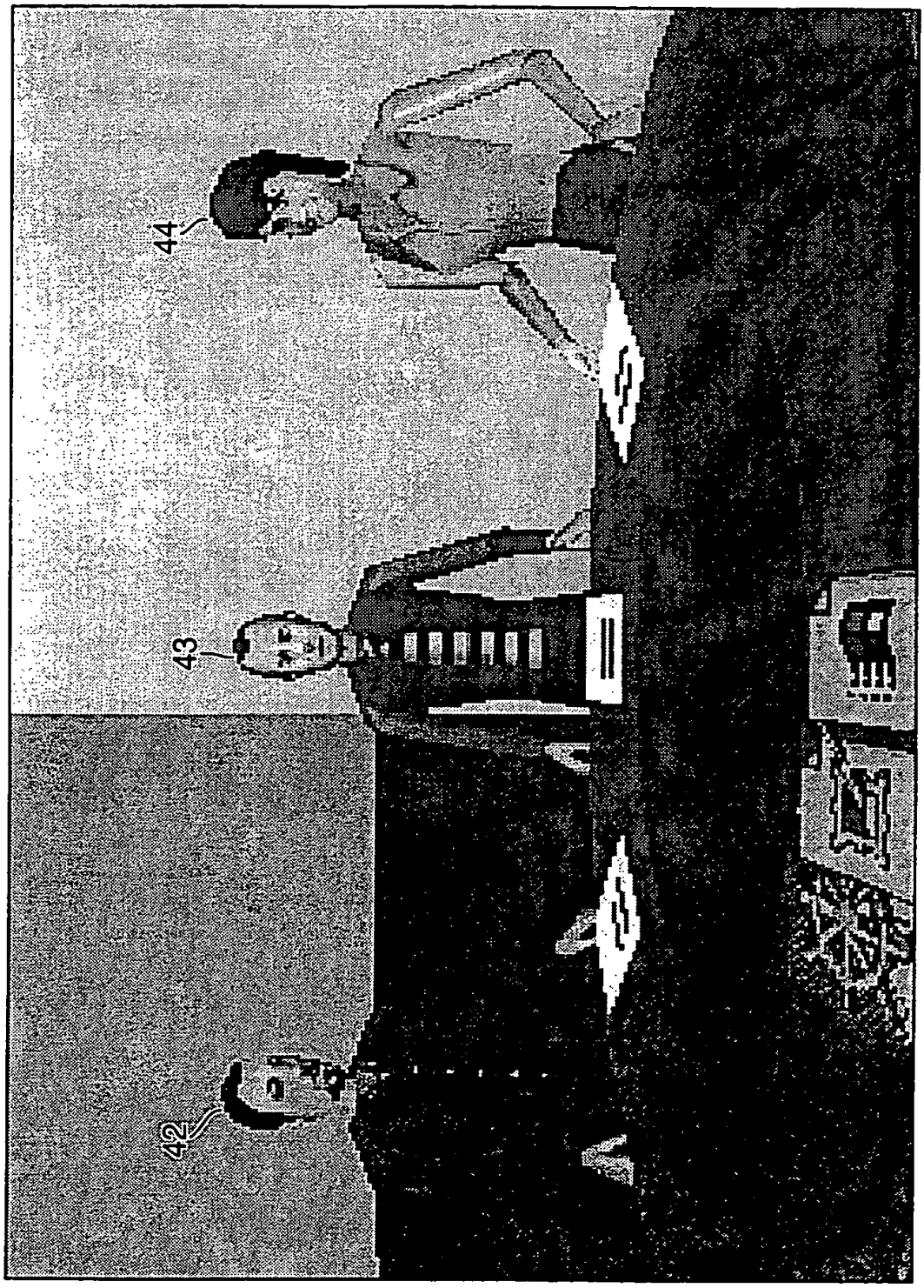


Fig.3a.

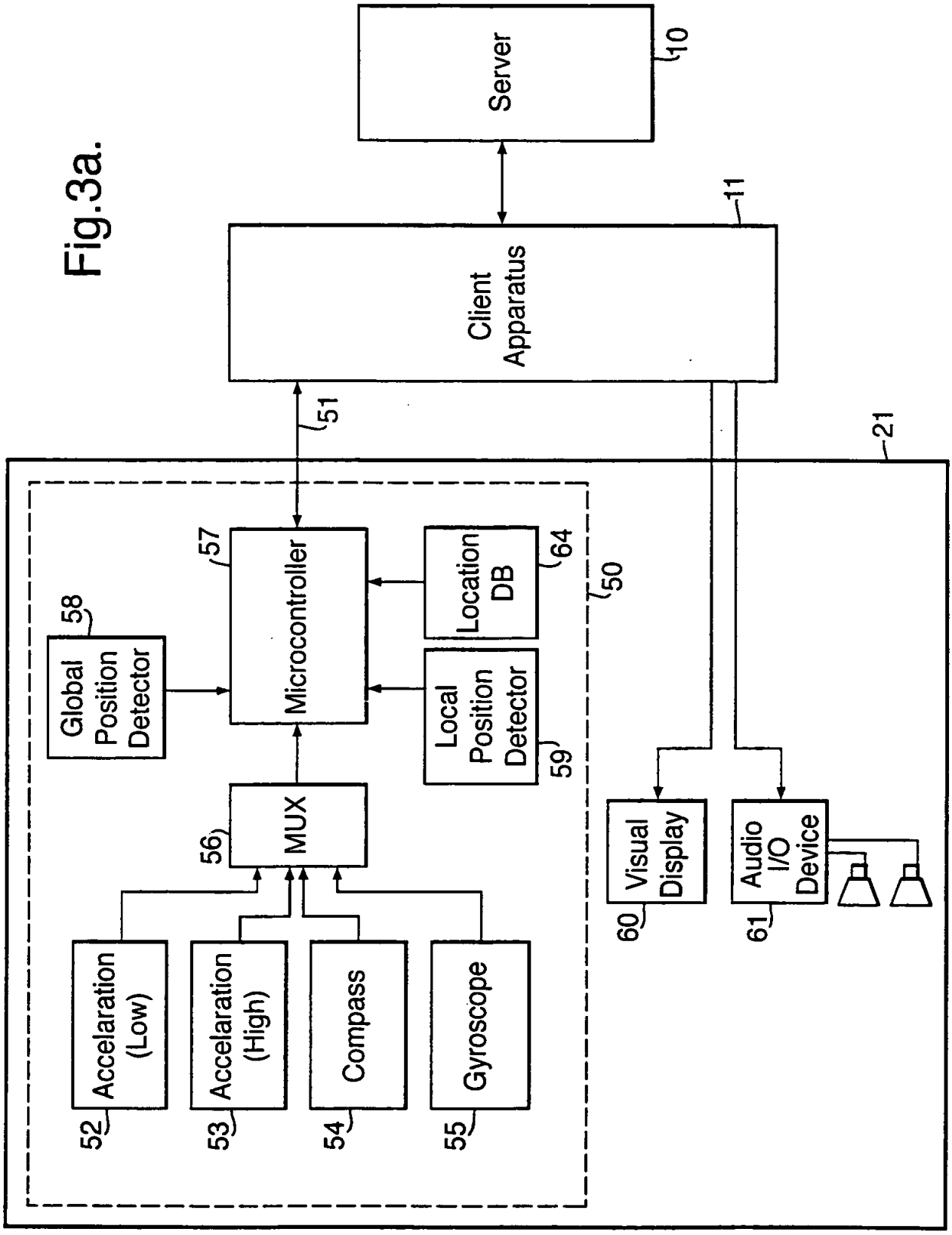

Server
10
Client Apparatus
11
51
21
57
Microcontroller
Location DB
64
50
58
Global Position Detector
Local Position Detector
59
MUX
56
Visual Display
60
Audio I/O Device
61
Accelaration (Low)
52
Accelaration (High)
53
Compass
54
Gyroscope
55

Fig.3b.

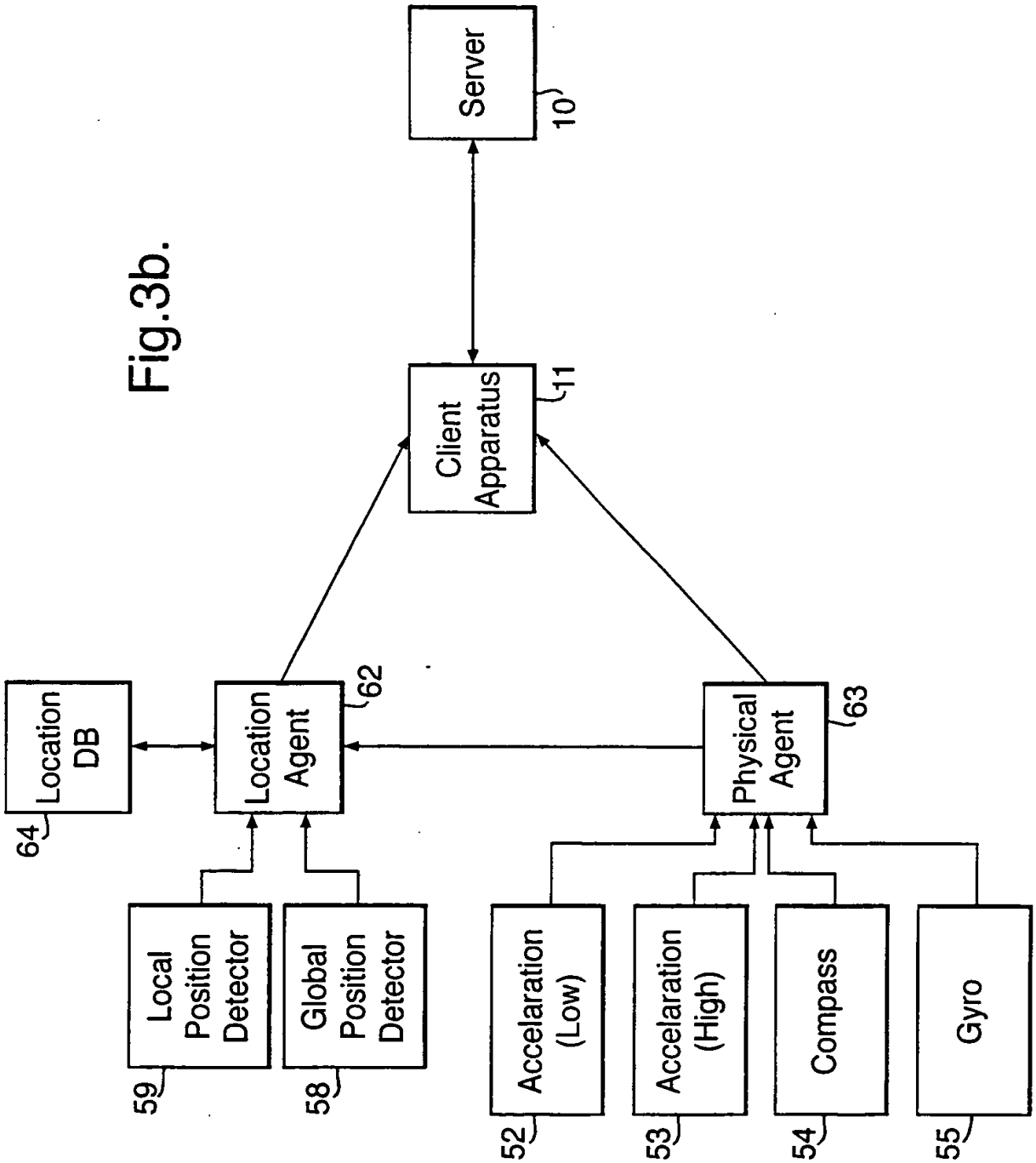

Server
10
Client Apparatus
11
Location DB
64
Location Agent
62
Physical Agent
63
Local Position Detector
59
Global Position Detector
58
Accelaration (Low)
52
Accelaration (High)
53
Compass
54
Gyro
55

Fig.4.

User on line
audio + keyboard
at least

Fig.5.

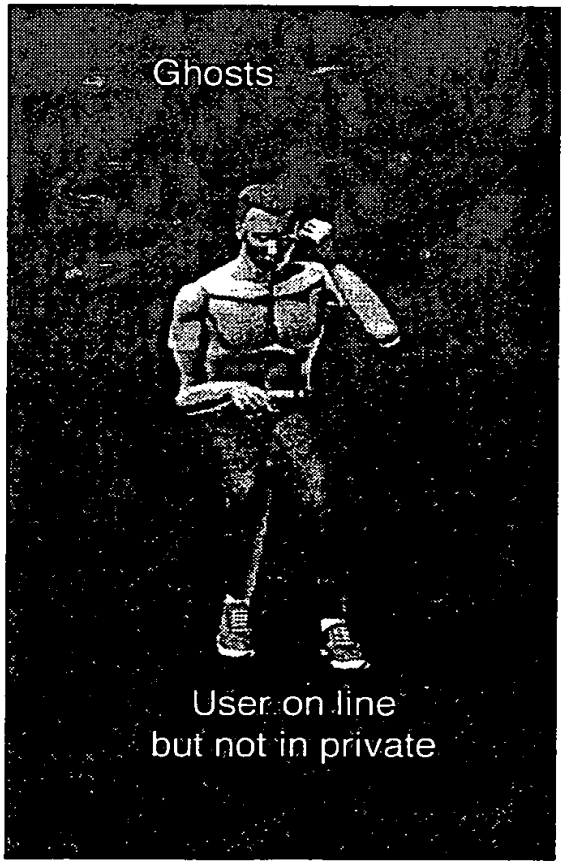
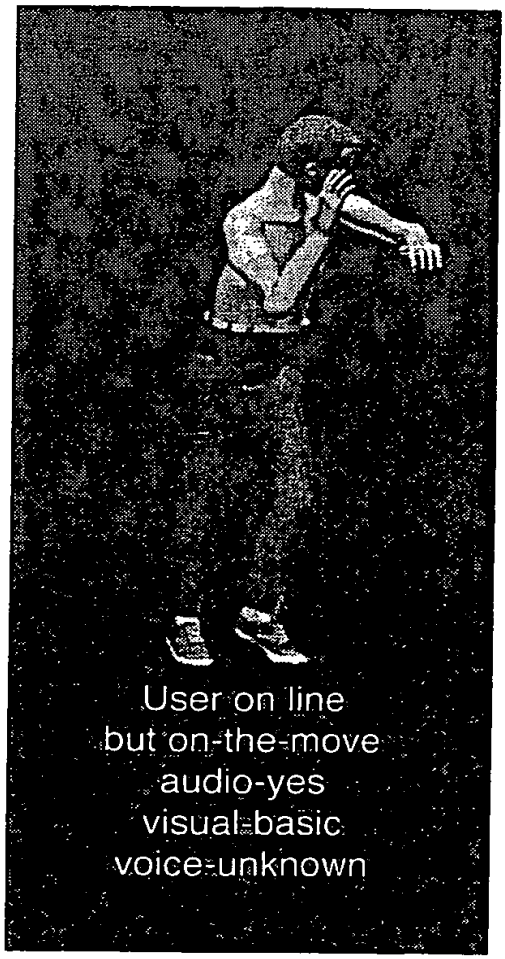

Ghosts
User on line
but not in private

Fig.6.

User on line
but distracted

Fig.7.


User on line
but on-the-move
audio-yes
visual-basic
voice-unknown

INTERNATIONAL SEARCH REPORT

International Application No
PCT/[redacted] 00/03970

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F3/00 H04M3/56 H04Q7/38 G06F3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F H04M H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 453 128 A (AMERICAN TELEPHONE & TELEGRAPH) 23 October 1991 (1991-10-23)	5,8
A	abstract figure 19	1-4,6,7
Y	WO 98 25423 A (NOKIA TELECOMMUNICATIONS OY ;KINNUNEN KIMMO (FI); SCHRODERUS OSMO) 11 June 1998 (1998-06-11)	5,8
A	page 9, line 23 - line 31	1-4,6,7

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 January 2001	25/01/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Schweitz, M

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	COLOMBO C ET AL: "PROTOTYPE OF A VISION-BASED GAZE-DRIVEN MAN-MACHINE INTERFACE" PROCEEDINGS OF THE IEEE/RSJ INTERNATIONAL CONFERENCE ON INTELLIGENT ROBOTS AND SYSTEMS (IROS),US,LOS ALAMITOS, IEEE COMP. SOC. PRESS, 1995, pages 188-192, XP000740890 ISBN: 0-7803-3006-4 the whole document	1-8
A	US 5 570 301 A (BARRUS JOHN W) 29 October 1996 (1996-10-29) column 2, line 36 -column 3, line 41 figures 1-3	1-8
A	US 5 907 604 A (HSU P ROBERT) 25 May 1999 (1999-05-25) column 1, line 66 -column 2, line 41 figure 3	1-8

INTERNATIONAL SEARCH REPORT

Inter[redacted]al Application No
PCT/GB 00/03970

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WO 9825423 A	11-06-1998	FI 964817 A	03-06-1998
		AU 5222798 A	29-06-1998
		EP 0941622 A	15-09-1999
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US 5907604 A	25-05-1999	NONE	